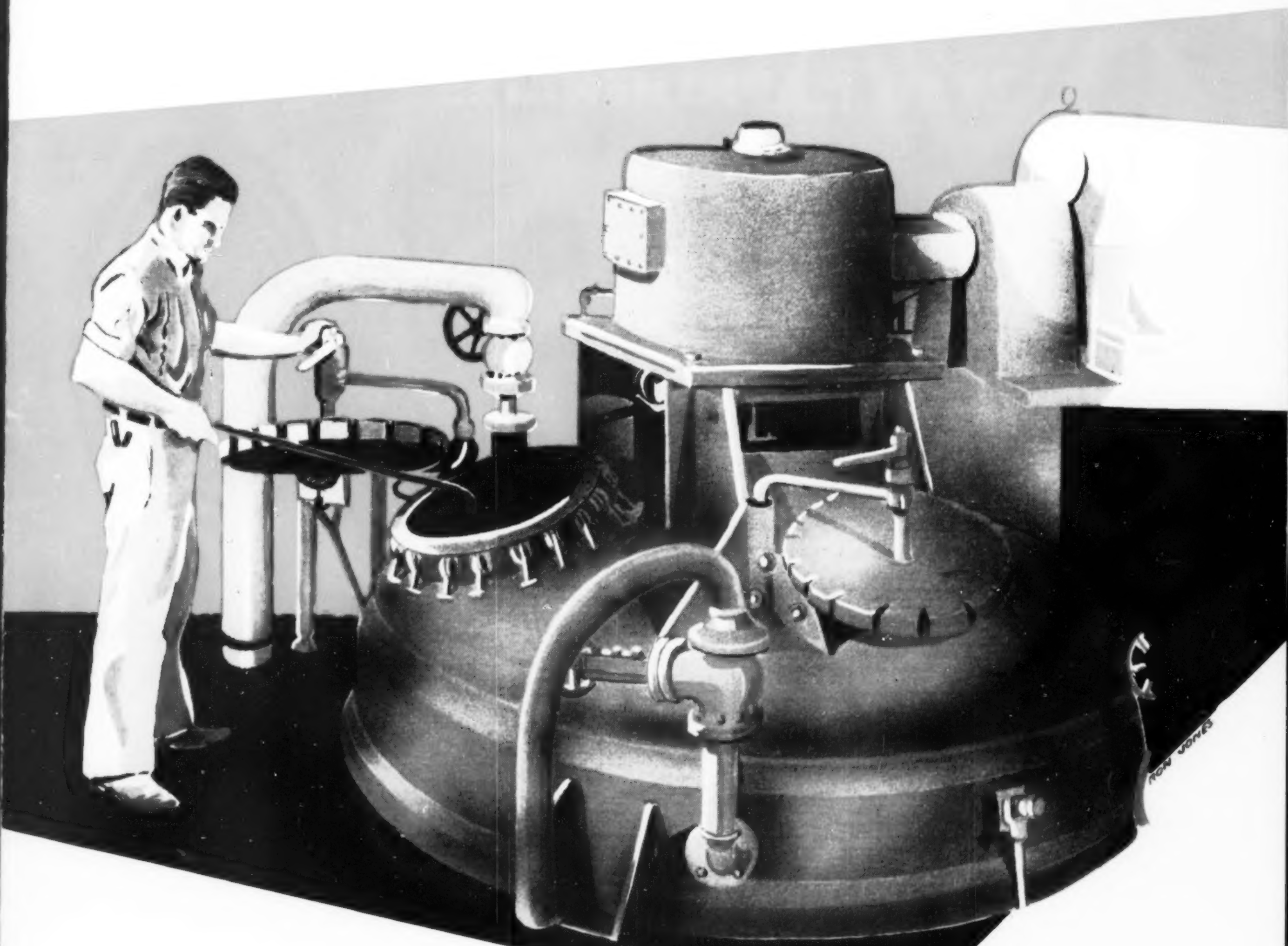
JANUARY • 1959

NLGI Spokesman

Journal of National Lubricating Grease Institute

NATIONAL LUBRICATING NLGI GREASE INST



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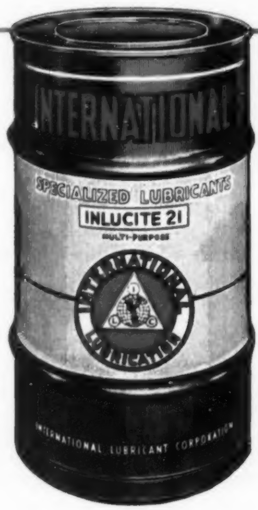

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President's page

by H. L. HEMMINGWAY, President, N L G I

COUNT YOUR BLESSINGS

There is a popular song going around called "Count Your Blessings" which seems to be a good thing to do as we start a new year.

As an industry, we should have many blessings in 1955. One is that economic forecasters predict an upturn in industrial business, which will automatically help lubricating grease sales. Another is that all of the great automobile manufacturers are devoting every possible sales effort toward selling more cars—creating new customers for lubricating grease.

The year 1955 should also see more and more new highway or other construction, and this should create substantial markets for our main products.

Our raw materials are all in adequate supply and healthy competition exists among our suppliers.

Your Institute is in healthy financial condition, is gaining new members, and is blessed with enthusiastic, progressive activity within its various committees to render additional service to its members.

And to demonstrate another blessing, if you will take the time to look over the issues of your NLGI SPOKESMAN of four to seven years ago, you will be impressed by the progress that has been made here and the increasing value of this publication to our industry in its world-wide distribution.

In these troubled times there is a strong tendency to concentrate all our attention on our problems. We can, however, approach 1955 with renewed hope if we will only "Count our Blessings."

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ABOUT THE COVER

This month our artist took it easy. We gave him a picture illustrating the article on page eight. It showed Mr. M. L. Shaw (California Research) sampling one of more than sixty batches of grease which were tested in developing the correlation between apparent viscosity and other grease properties. The kettles came out fine. Our apologies to Mr. Shaw. We're still trying to find out who artist Ronald Jones had in mind when he drew his picture.

Some New Approaches

TO THE MEASUREMENT AND PREDICTION OF THE APPARENT VISCOSITY OF LUBRICATING GREASES

J. L. DREHER
C. F. CARTER
E. B. REID

California Research Corporation

During the past decade, apparent viscosity has become widely recognized as an excellent means of characterizing the flow properties of lubricating greases. Industry has found it useful because it correlates well with pumpability, and it has been used by the Government and Armed Forces in describing greases for low temperature services. Almost without exception, specifications for lubricating greases designed for low temperature service contain apparent viscosity requirements.

Unfortunately, the use of apparent viscosity to characterize the flow properties of greases over a wide range of temperature has developed more rapidly than has the standardization of the method of measurement. Although many specifications contain apparent viscosity requirements, particularly at low temperatures, there is no widely accepted apparatus or procedure for the determination of apparent viscosity at temperatures other than room temperature. ASTM Method D 1092-50T, Apparent Viscosity of Lubricating Greases, applies only to room temperature determinations. Because the apparatus and procedure have not been standardized for operation over a wide temperature range, results at low temperatures obtained by various laboratories frequently differ considerably.

ASTM Committee D-2 has recognized the problem and is currently conducting an investigation which will undoubtedly result in improved repeatability and reproducibility. With the thought of facilitating the establishment of a standardized method, the apparatus and procedure used at California Research Corporation are described below. Also reported are some data developed with the aid of a statistical method, which show quantitatively the dependency of apparent viscosity on (1) soap content, (2) viscosity of the mineral oil, and (3) worked penetration of the grease.

Pressure Viscometer Apparatus

A schematic diagram and a photograph of the pressure viscometer apparatus are shown in Figures 1 and 2 respectively. The principal features of the apparatus are (1) location of the Zenith pump outside the constant temperature bath, (2) circular, constant temperature bath to hold six test cylinders mounted vertically, and (3) provision for the direct measurement of the rate of flow of grease.

The location of the pump outside of the bath has one particular advantage, ready accessibility for maintenance and repair. In order to minimize slippage at high operating pressure, the pump is charged with an oil having a viscosity of 500 SSU at 100° F. As shown in Figure 1, the viscous oil is pumped into a closed cylinder containing a floating piston by means of which the pressure is transmitted to the usual light hydraulic oil. Before the piston reaches the top of the cylinder, the pressure on the system is released, the valve to the reservoir above the cylinder opened, and a steel rod inserted to force the piston back to the bottom. The location of the piston can be judged at all times by the level of viscous oil in the reservoir.

The pressure on the system is measured in the conventional manner by three precision Bourdon gages covering the ranges of 0-800 psi, 0-2000 psi, and 0-5000 psi. Each gage is connected to the system through an automatic shut-off valve, which prevents the gage from being subjected to pressures beyond its capacity.

The circular design of the constant temperature bath permits ready accessibility to the six test cylinders which are mounted vertically around the periphery of the bath. The circulation system, which is in the center of the bath, consists of two 3-inch, pitched propellers located inside of a section of 6-inch pipe and connected to a one-quarter horsepower electric motor. The adequacy of the circulation system is indicated by a temperature gradient in the vicinity of the test cylinders and capillaries of less than 0.1°F at −65°F. For low temperature operations, Dry Ice is used as a coolant and denatured ethyl alcohol as the cooling medium. The basket for the Dry Ice is located in the center of the bath, as indicated in the schematic diagram. At elevated temperatures, a suitable mineral oil is used in the bath. The temperature is measured by a copper-constantan thermocouple connected to a precision potentiometer, which is periodically checked against a recording resistance thermometer calibrated by the U. S. Bureau of Standards. The temperature is controlled by a bimetallic regulator connected to a 1000-watt heater. Additional heaters are inserted in the bath for operation at elevated temperatures.

As shown in Figure 1, the reservoir above the capillary is connected to a burette; and this system is filled with a suitable liquid, which for low temperature tests is denatured alcohol. The grease forced through the capillary displaces an equal volume of the liquid at the test temperature which can then be measured in the burette at room temperature. In order to determine the correction for the volume change due to expansion or contraction, the displaced liquid is passed through a heat exchanger, thereby adjusting its temperature to room temperature.

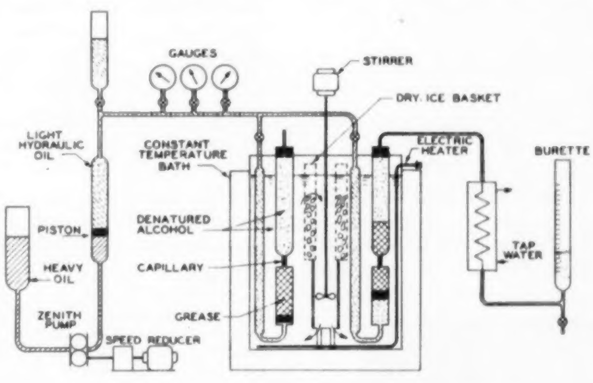


Figure 1—Schematic Diagram of Pressure Viscometer

The usual method of determining flow rates depends on precalibration of the pump and on occasional checks. Direct measurement of flow has the big advantage that it eliminates possible errors due to unknown changes in calibration, leaks in the system between the pump and the capillary, and unknown slippage within the pump, especially at high pressure. The last-named effect is recognized by the present ASTM method in that calibrations are made at high discharge pressures.

Procedure for Determination of Apparent Viscosity

Briefly, the procedure for the determination of apparent viscosity is as follows: The grease cylinders are filled carefully to minimize entrapped air and inserted in the constant temperature bath, as shown in Figure 1. After a suitable length of time to permit the grease to reach the specified temperature, the test is started. For low temperature tests, as required by most military specifications, the bath is cooled to the test temperature in approximately two hours after the insertion of the grease cylinders, and an additional two hours is allowed to elapse before the test is started. By means of a speed reducer, the speed of the Zenith pump is adjusted to maintain a desired pressure on the system. After the system reaches equilibrium, the volume of liquid displaced into the burette by the grease forced through the capillary is measured over a suitable time interval. Following appropriate adjustment of the volume for expansion or contraction, the rate of flow of the grease is calculated and expressed in cubic centimeters per second. To cover the desired range of shear rates, measurements are made over an appropriate range of pressures.

Relationship Between Apparent Viscosity and Other Grease Properties

It has been shown previously[1, 2, 3] that the apparent viscosity of a lubricating grease prepared with a given type of thickener (usually a soap) is dependent upon one or more of the following properties: (1) viscosity of the mineral oil, (2) concentration of the soap, and (3) consistency of the grease. In general, however, the relationship established between the above properties and apparent viscosity have been only qualitative. It is evident that a quantitative relationship capable of predicting apparent viscosity with reliable accuracy would be a valuable aid in the manufacture of greases which must comply with specified apparent viscosity requirements. This type of relationship for apparent viscosity at −65°F has been developed for a lithium-calcium base grease which is qualified under Automotive and Artillery Grease Specification MIL-G-10924 (ORD), Amendment 1. A few greases of the same type, but in which large deviations were purposely made, are also included.

The relationship which was developed with the aid of IBM punched cards is as follows:

$$AV = 6200 - 85P + 1020S + 305V$$

Where AV = Apparent viscosity, poises at 25 $sec.^{-1}$ and −65°F.

P = ASTM worked penetration.

S = Soap content, per cent by weight.

V = Viscosity of the mineral oil, SSU at 100°F.

The above equation, which was derived by the method of least squares[4], is based on data obtained from 62 batches of grease, in which the worked penetration varied from 310 to 349, the viscosity of the mineral oil from 69.8 to 132.0 SSU at 100°F, the concentration of soap from

7.8% to 12.6% by weight, and the apparent viscosity from 7600 to 30,000 poises.

A nomograph based on the above equation by which the apparent viscosity can be quickly calculated is shown in Figure 3. By means of this nomograph, the manufacture of a batch of grease can be accurately controlled so that the finished product will readily comply with the apparent viscosity requirements. For example, it can be determined from the chart that a grease containing 10.6% soap and a mineral oil with a viscosity of 73.0 SSU at 100°F and having a worked penetration of 281 has an apparent viscosity of 15,500 poises. If the maximum limit is 15,000 poises, additional oil must be added. From experience, it is known that sufficient oil to lower the soap content to 9.6% will increase the worked penetration to 295. According to the nomograph, the apparent viscosity of the resultant grease is 13,200 poises, well within the maximum limit.

Reliability of the Correlation

Statistically, the reliability of the above equation can be estimated in two ways: by the standard deviation and by the coefficient of determination. The standard deviation, which is an indication of how closely a given determination can be estimated, is calculated by the following equation:

$$\bar{S}=\sqrt{\frac{\Sigma d^2}{n-m}}$$

Where $\bar{S}$ = Standard deviation (sometimes called standard error of estimate).

d = Difference between the measured and computed values.

Σd^2 = Sum of the squares of all the differences.

n = Number of points of data, which in the above correlation is 62.

m = Number of constants in the equation, which in this case is 4.

The standard deviation is of value in establishing the reliability of a given correlation because from it "confidence limits" can be set. For example, it can be shown statistically that one half of the results of a given set of determinations will not differ from the results calculated by the correlation by more than 0.674 $\bar{S}$. Therefore, 0.674 $\bar{S}$ is called the 50% confidence limit. Also, it can be shown[5] that the 67%, 90%, and 95% confidence limits are 1.00 $\bar{S}$, 1.65 $\bar{S}$, and 1.96 $\bar{S}$, respectively.

In the case of the above correlation, the standard deviation, $\bar{S}$, is 1380. From this value the confidence limits of the correlation can be calculated and are given in Table I.

TABLE I

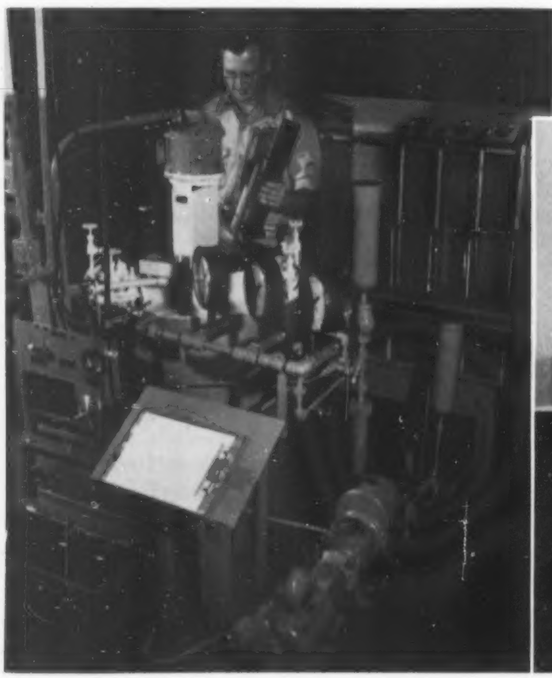
Confidence Limits of Apparent Viscosity Correlation

Confidence Limits Per Cent	*Poises*
50	930
67	1380
90	2280
95	2710

On the basis of the values in Table I, it can be stated that if 100 more determinations were to be made, 50 or one half of the results would be within 930 poises of the predicted values, and 95 would be within 2710 poises of the predicted values. It is of considerable help to the grease maker to be able to predict the apparent viscosity of 95% of his batches of grease within 2710 poises.

The coefficient of determination is an indication of the reliability of the correlation because it is a measure of the extent to which all variables are accounted for. For example, in the above correlation it is assumed that the important variables influencing the apparent viscosity are soap content, viscosity of the mineral oil, and worked penetration. If these three properties were not the most

Figure 2—Pictured at the left is L. S. Dicely placing a test cylinder into the constant temperature bath, prior to making a pressure viscosity measurement on a grease which was previously charged into the cylinder. Below are shown the authors, J. L. Dreher, C. F. Carter, and E. B. Reid, discussing the correlation results as they emerge from the IBM computer.



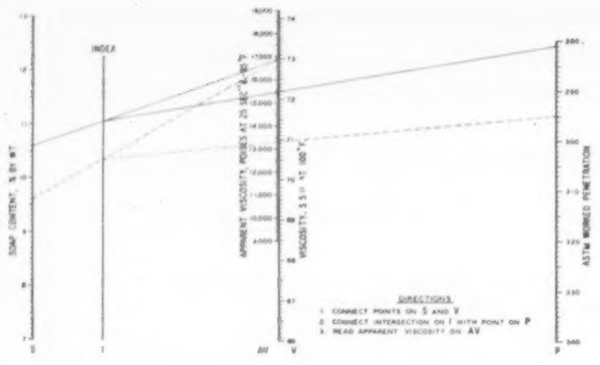


Figure 3—Nomograph for Calculation of Apparent Viscosity

important ones, the coefficient of determination would approach zero. If, on the other hand, they are the most important ones and the data are reasonably accurate, the coefficient would approach unity.

The formula for the calculation of the coefficient of determination is as follows:

$$\text{Coefficient of Determination} = 1 - \frac{(\bar{S}_e)^2}{(\bar{S}_a)^2}$$

Where $\bar{S}_e$=Standard deviation about the correlation.

$\bar{S}_a$=Standard deviation about the average.

It can be seen from this equation that if the correlation is perfect, $\bar{S}_e$ is zero, and the coefficient is one. On the other hand, if the correlation is very poor, $\bar{S}_e$ approaches $\bar{S}_a$. Consequently, $(\bar{S}_e)^2/(\bar{S}_a)^2$ approaches one, and the coefficient will be almost zero. In general, the smaller the range of variation of the variables, the poorer will be the coefficient of determination because the experimental errors become a greater part of the variation.

In the case of the above correlation, the coefficient of determination is 0.82. This means that 82% of the variation in apparent viscosity is accounted for by variations in the selected three independent variables of soap content, viscosity of the mineral oil, and worked penetration. In view of the relatively narrow range of variation of these three variables, the establishment of a correlation with a coefficient as high as 0.82 is considered excellent. The unaccounted-for 18% can be attributed to (1) other independent variables not considered, (2) inadequate selection of the means of measuring the variables which were considered, and (3) experimental errors.

Although there may be properties other than the three considered in this correlation which affect the apparent viscosity, a coefficient of determination as high as 0.82 indicates that they are not of major importance. In this connection, an attempt was made to correlate the apparent viscosity with only soap content and viscosity. In this case, the coefficient was 0.78, and the standard deviation was 1525, as compared to 1380 in the previous case when penetration was considered. These values show that apparent viscosity is affected by the worked penetration, although not to a marked extent.

A large portion of the unaccounted-for 18% is probably due to the inadequate selection of the means of measuring the variables which were considered in the correlation. Undoubtedly, a better coefficient would have resulted from the use of the viscosity of the mineral oil at −65°F, the test temperature for determining the apparent viscosity, instead of the viscosity at 100°F. Although the same type of oil, which was a highly treated naphthenic base oil, was used in all 62 greases, there was undoubtedly some variation in the viscosity index and pour point. The use of viscosities measured at −65°F would have tended to eliminate the effect of these variations. Also, for the purposes of this correlation, worked penetration is probably not the best measure of consistency.

Discussion

The above correlation equation is linear. This is probably due to the limited range of variation of the data from which it was derived. It is believed that, if the range of variation had been greater, the equation would have been nonlinear, at least with respect to some of the variables. For the range of conditions encountered, however, the relationship is adequate and shows that apparent viscosity can be effected by each of three independent variables, consistency, soap (or thickener) concentration, and viscosity of the fluid component of the grease.

Under other test conditions, it is probable that some of these variables would have only negligible effect. For example, the effect of consistency, at least as measured by penetration, would probably become negligible at high shear rates, particularly for greases containing very viscous oils. On the other hand, for greases made from very light oils, the effect of viscosity would probably become negligible at low shear rates.

It is expected that in time, with more accurate measurement of apparent viscosity and with continued study, equations will be developed that will permit the prediction of apparent viscosity for a wide range of conditions and for a large number of different types of grease.

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★

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★

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H. M. FRASER

International Lubricant Corporation Vice President Receives NLGI Award for Outstanding Achievement

His remarks following the presentation, giving full credit for the honor to his fellow workers, appear below.

ACCEPTANCE OF AWARD
at the
ANNUAL DINNER OF THE NATIONAL LUBRICATING GREASE INSTITUTE
San Francisco, Calif., October 26, 1954

Mr. Olsen, Ladies and Gentlemen:

I wish, for a few moments this evening, that I had the eloquence of Winston Churchill or William Jennings Bryan. Then, I might adequately express my feelings at this time. But not having been so endowed, I can only say with deep sincerity and humility—"Thank You."

I also want to thank my fine group of co-workers. That group consists of laborers, technicians, mechanics, chemists, engineers, office help, sales and management. They have done so much to make this occasion possible.

I shall cherish this award as long as I live.

The user cannot see it by looking in the container, but when he finds a lubricant doing an outstanding job, it's 2 to 1 a Metasap Aluminum Stearate Base is incorporated therein.

For Metasap Aluminum Stearates are today's *foremost* development in grease making. Lubricants made with them are moisture-proof, temperature-resistant, water-repellent . . . clear and uniform . . . able to perform superlatively under the tougest conditions.

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DISCUSSION OF: Estersils . . . A New Class of Siliceous Thickening Agents

The following discussions were presented at the twenty-second annual meeting in San Francisco.

The paper appeared in the December 1954 issue of the NLGI SPOKESMAN.

DISCUSSION

Presented by

A. BONDI and W. H. PETERSON

Shell Development Company

We wish to congratulate the authors, Dr. Meyer and Dr. Braendle, on their excellent paper describing the manufacture of du Pont's esterified silica. They have detailed the many variables that need consideration when manufacturing an inorganic microgel suitable for grease making. Our appreciation of the fine work done in developing this gel agent comes from the many years spent by our Shell group in also developing an inexpensive inorganic gel agent for greases. We felt that by adding a few comments the concepts advanced in this paper might be broadened to include other inorganic gel agents.

I imagine that there is hardly a grease research man who has not tried his hand at one or the other of the ever increasing number of colloidal particles which are now offered as gelling agents for oils. To point up the relative position of the Estersils in this field, we have only to observe the electron micrographs of typical grease gelling agents so frequently published in present day grease articles.

If we group these as to their geometry there are first the well-known anisometric particles which include fibrous soap, rod-like copper phthalocyanine and attapulgite clays, and finally the ribbons or platelets of montmorillonite clays. Second are the typical isometric particles such as the silica(aero)sol particles and some of the carbon blacks used in grease making; however, most of the isometric particles group to form porous sponges such as some soaps, silica gel, and also Estersil, as shown in the fine electron micrographs presented by Meyer and Braendle. A review of the mechanism by which the various particles achieve gel formation would be beyond the scope even of an invited discussion, but it is interesting that the geometry of the particle is far less important than the nature of the particle surface in the gelling action, so that the mechanical properties of greases made from these different gel agents are closely the same.

As pointed out in the du Pont paper, the consistency of the silica Estersil responds exceedingly strongly to the presence of small concentrations of moisture. This is true of many inorganic gels and unless moisture concentration is carefully controlled, process development data such as were presented in this paper may be seriously misleading. Other polar substances (especially alcohols) can function similarly and the effect of such compounds often makes it difficult to use these gel agents to make properly functioning greases from synthetic lubricants.

Another point: whereas many soaps have their "raincoat," i.e., water resistance, built-in together with the right proportion of attractive forces for the oil medium, the usefulness of the inorganic base greases is intimately tied up with the choice and dosage of the water-proofing agent. The water-proofing agent in the case of the Estersils is attached to the surface by covalent bonds, and that of some organobentonites by ionic bonds, but a large

portion of the growing patent literature on the subject covers water-proofants which are attached to the inorganic particles by physical adsorption mechanisms. All of them—although to different degrees—share the problem of inherent incompatibility of complete coverage of the particle surface by water-proofing agent with their ability to form gels. The achievement of a workable solution by using near complete esterification with a short chain alcohol has been described by the authors of the paper under discussion. They have also pointed up the great effect of mechanical pretreatment of the gel agent on the consistency and emulsibility properties of the grease. Probably no one working with inorganic base greases has been spared this same sort of rationalizing of the composition for best grease performance and the several processing variables upon which the success of the entire venture depends.

Largely, the performance tests decide what this combined optimum should be. Since a modern multipurpose grease has to meet over eighty different specification and performance tests, there is always at least one or more qualifications to haunt a new product. The authors pointed out that rust protection or performance under water wet conditions plays this role with their grease, as it does with several inorganic base and even some soap base greases.

In concluding, we should like to discuss this one performance feature since it causes trouble in so many greases. Bench corrosion tests were evolved (by our lubrication engineers) over several years in close correlation with field observations. In the course of this work two types of corrosion were observed: One occurs in the operating bearing due to the lubricant film stripping from the bearing surfaces and for this reason we have called it "dynamic corrosion." Corrosion of this type gives a uniform discolor to the grease and bearing unless the bearing freezes or seizes due to lack of lubricant. The other type of corrosion occurs in a bearing at rest and is characterized by stain marks where the roller or ball has rested on the race. These corrosion marks become areas of stress concentration when the bearing is again operated and through metal fatigue lead to spalling. Thus early failure of the bearing results from such corrosion.

In industrial lubrication moisture contamination is often a problem. Therefore, we believe that successful industrial multipurpose greases must have the ability to lubricate well in the presence of moisture and to prevent corrosion.

DISCUSSION

Presented by

W. L. HAYNE *and* D. R. OBERLINK

Standard Oil Company (Indiana)

The authors should be complimented for an informative and interesting paper. They have presented laboratory tests that show Estersil to be a promising thickener for grease.

On the basis of our laboratory tests, which agree with those presented, we prepared an Estersil grease of No. 1 consistency for field tests under severe conditions. You may be interested in the results of service tests that show three outstanding properties of the Estersil grease: heat resistance, mechanical stability, and water resistance.

High-temperature applications in which this product is being used successfully include drying ovens in rubber plants, induced-draft fans in power stations, kiln-car wheels in brickyards and conveyors in steel mills and glass factories. In conveyor-trolley bearings that travel through paint and enameling ovens, high-temperature stability is needed to keep the conveyor moving smoothly and to prevent lubricant leakage on the coated articles. Except when the oven is operated for long periods at temperatures above the range in which petroleum oils are stable, the Estersil grease gives satisfactory service. Solder-roll bearings in a condensed-milk canning plant have been lubricated successfully by flushing with fresh grease every half hour.

Grease prepared with Estersil also has good mechanical stability. This property is being demonstrated in such severe services as clutch pilot bearings in heavy duty trucks, and gear cases of industrial machinery.

Water resistance is shown in applications involving hot water and steam. Pumps and rotary joints in food plants and paper mills are lubricated successfully with this grease. Estersil grease has also been used to lubricate felt-roll bearings in paper machines.

Despite the variety of successful applications, Estersil grease may not be suitable for all high-speed services. In sprocket wheels and gears of portable tools, running temperatures were higher than with other greases. In high-speed ball bearings, however, the grease has shown outstanding performance. The versatility of Estersil grease justifies further study in difficult lubrication problems.

NLGI Associate and Technical Mem

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Trilla Cooperage, Inc.
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Representative—Lester Trilla

United States Steel Products
Division, United States Steel Company
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Representative—Wm. I. Hanrahan

Vulcan Stamping & Mfg. Co.
P. O. Box 161, Bellwood, Illinois
Representative—H. B. Scharbach

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Representative—Richard P. Field

Gray Company, Inc.
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Representative—B. A. Beaver

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Representative—G. A. Hubbard

Stewart-Warner Corporation
Alemite Division
1826 Diversey Parkway, Chicago 14, Illinois
Representative—D. C. Peterson

United States Air Compressor Co.
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Representative—C. A. Bening

MARKETING ORGANIZATIONS

California Texas Oil Company, Ltd.
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Representative—Hal U. Fisher

Canadian Petrofina Limited
1015 Beaver Hall Hill
Montreal, Quebec, Canada
Representative—M. E. Wight

REFINERS

Farmers Union Central Exch., Inc.
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Representative—H. F. Wagner

Mid-Continent Petroleum Corp.
Mid-Continent Bldg., P. O. Box 381, Tulsa, Okla.
Representative—J. W. Basore

Valvoline Oil Company
Division of Ashland Oil & Refining Co. Box G
Freedom, Pennsylvania
Representative—D. A. Smith

SUPPLIERS OF EQUIPMENT FOR MANUFACTURING LUBRICATING GREASES

Blaw-Knox Company
Buflovak Equipment Division
1543 Fillmore Ave., Buffalo 11, New York
Representative—Edward V. Hegg

Chemicolloid Laboratories, Inc.
30 Church St., New York 7, New York
Representative—David F. O'Keefe

The Girdler Company
A Div. of National Cylinder Gas Co. Box 987
Louisville 1, Kentucky
Representative—J. E. Slaughter, Jr.

Manton-Gaulin Mfg. Co., Inc.
44 Garden Street
Everett 49, Massachusetts
Representative—G. W. Eldridge

Morehouse Industries
707 Henry Grady Building, Atlanta 3, Georgia
Representative—George E. Missbach

The C. W. Nofsinger Company
906 Grand Ave., Kansas City 6, Missouri
Representative—C. W. Nofsinger

Stratford Engineering Corporation
1414 Dierks Bldg., Kansas City 6, Missouri
Representative—D. H. Putney

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60 East 42nd St., New York 17, New York

American Cyanamid Company
30 Rockefeller Plaza
New York 20, New York
Representative—R. B. Wainright

Archer-Daniels-Midland Company
Chemical Products Division, 2191 W. 110th St.
Cleveland 2, Ohio
Representative—Frank C. Haas

Armour & Co., Chemical Division
1355 West 31st St., Chicago 9, Illinois
Representative—H. F. Whitler

The Baker Castor Oil Company
120 Broadway, New York 5, New York
Representative—H. H. Fritts

Darling & Company
4201 South Ashland Ave., Chicago 9, Illinois
Representative—G. W. Trainor

E. I. du Pont de Nemours & Co.
Wilmington, Delaware
Representative—John R. Sabina

The Elco Lubricant Corporation
Jennings Road & Denison Avenue
Cleveland 9, Ohio
Representative—Frank X. Sieloff

Emery Industries, Inc.
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Representative—R. F. Brown

Enjay Company, Inc.
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Representative—Sidney W. Fay

Foote Mineral Company
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Representative—W. F. Luckenbach

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Chemical Division, 400 Second Ave. South
Minneapolis 1, Minnesota
Representative—Abner C. Hopkins, Jr.

A. Gross and Company
295 Madison Avenue, New York 17, N. Y.
Representative—Eugene W. Adams

W. C. Hardesty Company, Inc.
P. O. Drawer 110, Dover, Ohio
Representative—W. G. McLeod

Harshaw Chemical Company
1945 East 97th Street, Cleveland 6, Ohio
Representative—W. J. Straka

Leffingwell Chemical Company
P. O. Box 191, Whittier, California
Representative—D. E. Murphy

Lithium Corporation of America, Inc.
Rand Tower, Minneapolis 2, Minnesota
Representative—Walter M. Fenton

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Representative—C. E. Cosby

N. I. Malmstrom & Company
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Representative—Ivar Wm. Malmstrom

Metasap Chemical Corporation
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Representative—O. E. Lohrke

Minerals & Chemicals Corporation of America
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Representative—R. H. Hubbell, Jr.

Monsanto Chemical Company
1700 Second Street, St. Louis 4, Missouri
Representative—J. W. Newcombe

National Lead Company
Baroid Sales Div., 111 Broadway, N. Y. 5, N. Y.
Representative—H. H. Farnham

National Rosin Oil Products, Inc.
1270 Ave. of the Americas, N. Y. City 20, N. Y.
Representative—Richard Bender

Newridge Chemical Company
7025 West 66th Place, Chicago 38, Illinois
Representative—T. E. Shine

M. W. Parsons—Plymouth, Inc.
59 Beekman St., New York City 38, New York
Representative—Herbert Bye

Synthetic Products Company
1636 Wayside Rd., Cleveland 12, Ohio
Representative—Garry B. Curtiss

Swift & Company
165th & Indianapolis Blvd., Hammond, Ind.
Representative—F. H. Beneker

Vegetable Oil Products Co., Inc.
Vopcolene Division
5568 East 61st Street, Los Angeles 22, Calif.
Representative—C. F. Williams

Warwick Chemical Company
Division Sun Chemical Corp., 10-10 44th Ave.
Long Island City 1, New York
Representative—Dr. J. J. Whitfield

Witco Chemical Company
75 East Wacker Drive, Chicago 1, Illinois
Representative—E. F. Wagner

TECHNICAL AND RESEARCH ORGANIZATIONS

Institut Francais du Petrole
CMrR—Courtel, 4 Place Bir Hackeim
Rueil—Malmaison (S. et Oise) France

Les Laboratoires de Recherches Purfina
31 rue de la Loi, Bruxelles, Belgium
Representative—R. Gillerot

Midwest Research Institute
4049 Pennsylvania, Kansas City 2, Missouri
Representative—Dr. M. H. Thornton

Petroleum Educational Institute
9020 Melrose Avenue, Los Angeles 46, Calif.
Representative—G. A. Zamboni

Phoenix Chemical Laboratory, Inc.
3953 W. Shakespeare Ave., Chicago 47, Ill.
Representative—Mrs. G. A. Krawetz

Sociedad Nacional de Petroleos
Rua D. Pedro V, no. 80, Lisbon, Portugal
Representative—Manuel Corda Boullosa

Patents and Developments

Greases Containing Aryl Oxy Alkyl Salt Stabilizer

In patents discussed previously in this section, it has been suggested that there is an advantage in combining certain metal salts, particularly the metal salts or organic acids of low molecular weight, with the metal soaps which are ordinarily employed as thickeners for lubricating grease compositions. Addition of such salts is claimed to have utility for improving stability and high temperature properties of the grease.

There appear to be several theories as to the operation of such metal salts. One is that the addition of salts of low molecular weight acids to soaps of relatively high molecular weight results in the formation of a complex with superior grease thickening effect and improved stability.

In U. S. Patent 2,690,429 issued to Standard Oil Development Company, it is stated that, regardless of the phenomena involved, the addition of salts of low molecular weight compounds appears to be particularly advantageous in connection with greases of alkali and alkaline earth metal soap bases. Such compositions are said to be particularly receptive to the action of oxidation inhibitors.

In this patent, the salts of low molecular weight oxy acids are proposed for such compositions which are said to be stable in service with antifriction bearings operating at 300° F. and even higher. These low molecular weight acids contain an ether linkage and, in this respect, they resemble furoic acid and, in fact, greases prepared with salts of alkoxy acids such as ethoxy-propionic acid, methoxy benzoic acid, etc. are, in many respects, similar to the excellent high dropping point greases prepared from furoic acid salts. Grease formulations made with oxy aromatic acid salts have the added advantage of a low degree of water solubility and will wet metallic surfaces covered with water.

The relative proportions of the high molecular weight soap and of the low molecular weight salt may be varied rather widely. In molecular proportions, it is preferred to use one to three parts of the soap with about one to two parts of the salt. In general, however, it is preferable that the molecular proportions be more nearly equal and specifically, proportions of about one to one appear to be the most satisfactory. Further, the quantity of the soap and salt ingredients to be used in a given grease composition vary with the type of grease which is desired and also with the kind and the viscosity of the oil which is used as a liquid base. For a stiff grease composition, the total quantity of soap and salt may approach 50% of the weight of the final composition. On the other hand, for a soft grease, the total proportion of soap and salt may be as low as about 5% based on the weight of the entire composition.

In general, the grease should consist of a lubricating oil having a viscosity of about 35 to 200 SUS at 210° F. containing about 3 to 20 or 30% by weight of the metal soap of a C 12 to C 22 fatty acid or glyceride along with 2 to 15 or 20% by weight of the metal salt of the low molecular weight oxy acid portion. However, other oxy acids, such as methoxypropionic acid, propoxypropionic acid, p-methoxybenzoic acid, and the like, may be used.

For ordinary anti-friction bearing greases, the sodium soap and the sodium salt of ethoxypropionic acid are specifically preferred.

In the preferred composition, a substantially saturated fatty acid having an average chain length in the range of 12 to 22 carbon atoms is utilized, however, any of the fatty acids known in the art of grease manufacture may be employed. For ease of dispersion, generally, the higher molecular weight acids are preferred. These preferred acids consist predominantly of acids having a carbon chain length of 18 or slightly higher. They may be natural products such as stearic, arachidic, or the hydrogenated acids obtained from tallow or fish oil acid fractions.

For the liquid phase of the grease, mineral base lubricating oils are preferred but the invention is not necessarily limited to the mineral base oils. Various synthetic oils may also be used. As is well known in the art of grease making, certain synthetic esters, especially the dibasic acid esters, such as di-2-ethylhexyl sebacate and homologous and analogous esters are preferred for certain purposes in grease making. The lithium soap grease of such compounds, modified with the sodium or lithium salts of ethoxypropionic acid, and the like, are claimed to be particularly useful for lubrication at very low temperatures. Other synthetic oil base greases such as those employing the polyglycols or the glycol ethers are also contemplated as being within the scope of this invention. The combined soaps and salts may be used to thicken mixtures of mineral oil and synthetic oil as well as being useful with either type of oil alone.

An example of a grease composition containing the ethoxypropionic acid and its properties are described as follows:

a. Formulation

Ingredients:	*Per cent weight*
Ethoxypropionic acid	6.0
Hydrogenated fish oil acids	15.0
Sodium hydroxide	4.4
Phenyl alpha naphthylamine	1.0
Mineral lub. oil of 500 SUS vis. at 100° F. (55 at 210° F.)	73.6

b. Method of Preparation

The hydrogenated fish oil acids and ⅓ of the mineral oil were charged to a fire heated grease kettle and the temperature raised to 150° F. The ethoxypropionic acid was charged and the acids immediately coneutralized with a 30% aqueous solution of sodium hydroxide. The temperature was raised to 220° F. and, when the soap concentrate was fairly dry, additional oil was slowly added while raising the temperature to 440° F. All of the oil should be added by this time. The phenyl-alpha-naphthylamine was added and the grease drawn into pans for cooling. The cold grease was returned to the kettle

for homogenization and then filtered and packaged.

Properties:

Per cent free alkali	0.12 as NaOH
Appearance	yellow-smooth short fiber
Dropping point—° F.	446
Worked penetration mm/10	306
Structure stability to mechanical working penetration after 100,000 strokes fine hole worker plate	339 mm/10
Water washing test—per cent loss (125° F. water temperature)	0.0
Wheel bearing test, 6 hours at 220° F.	Pass, conditions and lubrication excellent
High temperature spindle test 204 bearing, 10,000 R.P.M.—300° F.	400 hours before bearing failure —grease still in good condition

News Items

Gulf-Ex-A is a new multi-purpose automotive grease offered by Gulf Oil Corporation. It is a lithium base grease claimed to have good resistance to breakdown in service, and non-separating over long storage periods (N.Y.J. Commerce 4/14/54 p. 15).

Lithium grease expansion increased 4-fold in 5 years. Considerable more expansion is expected. (Chem. Week 5/1/54 p. 55).

Lubricating films of colloidal Molybdenum disulfide in an epoxy resin base are claimed to provide good adhesion and wear resistance, and can be used at 500° F. (Iron Age 7/1/54 p. 61).

Triethanolamine titanate made by Titanium Pigment Corp. is claimed to have anti-bleeding properties (Chem. & Engrg. News 7/26/54 p. 2999).

Esso Research Center developed an all-purpose grease (Multi Purpose Grease H) which is fibrous or stringy in structure (N.Y.J. Commerce 8/27/54 p. 7).

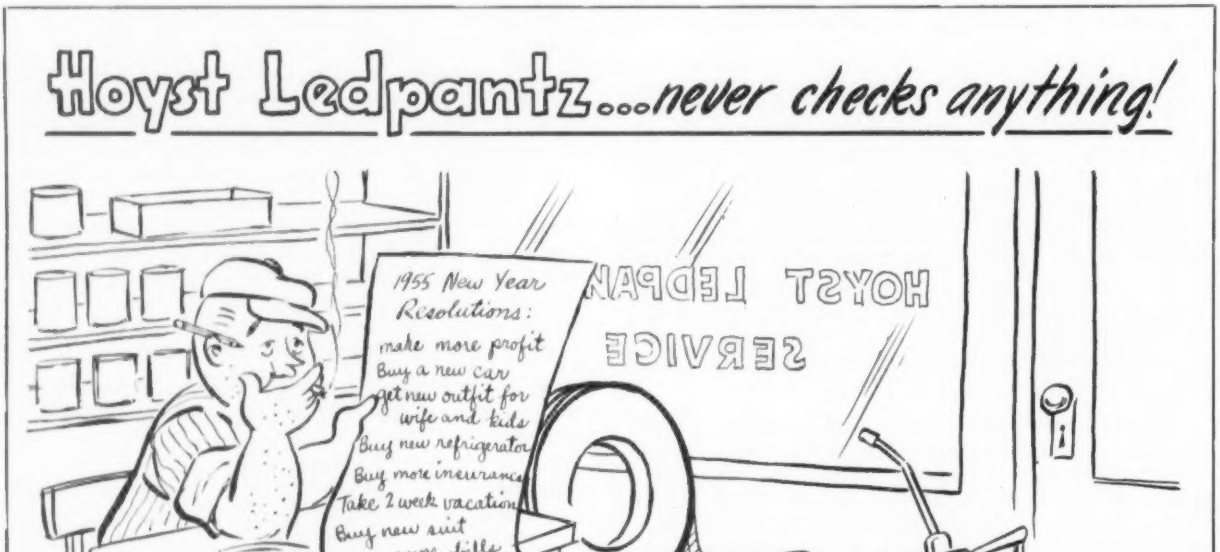
T. H. Newsome & Co. of Britain developed a gas-heated grease kettle using about 2.6 cu. ft. of gas/lb. of grease produced (Chem. Trade J. 8/20/54 p. 466).

U. S. Patent 2,683,012 (Stewart-Warner Corp.)—Tiltable lubricant container dolly.

U. S. Patent 2,686,281 (Shum)—Solenoid means for actuating grease guns.

U. S. Patent 2,686,625 (Our Savior's Evangelical Lutheran Church)—Grease dispensing pail base.

U. S. Patent 2,687,097 (Engseth)—Grease gun.



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Award

Technical Committee

Chairman T. G. Roehner, Director of the Technical Service Department, Socony-Vacuum Laboratories

Mr. L. C. Brunstrum, of the Standard Oil Company (Indiana), and Mr. E. W. Nelson, of Continental Oil Company, have agreed to serve as Vice Chairmen of the Technical Committee for the 1954-1955 term. They replace Mr. J. F. McGrogan, of The Atlantic Refining Company, and Mr. R. O. Rinearson, of The British-American Oil Co. Ltd.

Due to the many details which Hugh Hemmingway must handle as President of NLGI, he has found it necessary to resign as Chairman of the Subcommittee on Recommended Practices for Packing Automotive Front Wheel Bearings. We are very fortunate in obtaining Mr. P. V. Toffoli, of The Pure Oil Company, as his replacement. Mr. Toffoli worked closely with Mr. Hemmingway throughout the program which led to the recommended practices recently published. He, therefore, is familiar with the extensive background of the recommended practices and is eminently qualified to follow through on the activity initiated by Hugh Hemmingway.

The material for this Technical Column is being written before the deadline for return of the questionnaire distributed through Headquarters to all members of the Technical Committee. The questionnaire provides an opportunity for the members to express opinions regarding the advisability of including a Symposium on the agenda for the 1955 Annual Meeting in Chicago and, if their answers are in the affirmative, to record their preferences relative to the subject of the symposium. It was the consensus that the 1954 Symposium on the subject "Studies of Grease Structure—A Basis for New Developments" was a success. Mr. Brunstrum, Chairman of that Symposium Subcommittee, is arranging for publication of the lead-off papers and highlights of the subsequent discussions in the NLGI SPOKESMAN. When the stenotype reporter's record was converted to conventional type form it amounted to 34 pages. Obviously, much time and effort are needed to boil the recording down so that it plus the introductory talks will fit within one issue of the NLGI SPOKESMAN.

A tape recording was kept of the discussion of Mr. N. Marusov's report on the "NLGI Tentative Method for Matching Lubricating Grease Flow Properties with Lubricating Grease Dispensing Pump Delivery Behavior at Low Temperatures." Under his leadership a group is arranging to have the method published in an early issue of the NLGI SPOKESMAN, along with background information regarding the objectives and expected practical application of the method. A summary will also be given of the aforementioned discussions during the San Francisco meeting.

PEOPLE in the Industry

Gray, Connolly Advance at Gulf

Mr. Archie D. Gray has been elected Associate General Counsel of Gulf Oil Corporation and Mr. Russell G. Connolly has been elected Secretary, according to an announcement made in December.

Mr. Gray has been Associate General Attorney for Gulf and various of its subsidiary companies since 1947. Mr. Connolly has been a member of the company's Law Department since 1948.

A native of Franklin, Texas, Mr. Gray was educated at Texas A.&M. College and the University of Texas, receiving his law degree from the latter in 1923. Shortly after graduation from Law School, he was elected Mayor of Ennis, Texas, and later was elected and served four years as District Attorney in Waxahachie, Texas. He subsequently served as Assistant Attorney General of Texas in charge of oil and gas matters for that State.

Mr. Gray became associated with Gulf's law department as a trial attorney in Houston in 1935, continuing in that capacity until 1947 when he was appointed Associate General Attorney for the Corporation and its subsidiary companies. In 1953 he was transferred to the General Office in Pittsburgh.

Primarily engaged in trial work for Gulf, Mr. Gray has participated in trials of a great many important suits. He represented the Gulf Companies in the Madison Anti-trust Cases in 1937, and was successful in obtaining acquittal for these companies.

He served in the Infantry overseas during World War I.

Mr. Connolly, a native of Pittsburgh, is a graduate of the University of Pittsburgh and of the University of Pittsburgh Law School, and participated in the Advanced Management Program of Harvard Business School. Following his admittance to the Bar in 1939, he practiced law in association with his brother, J. Wray Connolly.

During World War II, Mr. Connolly joined the Armed Forces as a Private and served overseas in the Field Artillery.

Nopco Announces Personnel Promotions

Travis V. Rankin

Walter E. Brewer

Thomas A. Printon, President and Chairman of the Board of the Nopco Chemical Company has announced the appointment of Travis V. Rankin as General Sales Manager in charge of sales of all Nopco products at Nopco's Pacific Division. Mr. Rankin replaces Harold A. Swanson, who has become Assistant Vice President in charge of the Vitamin Division of Nopco.

Formerly District Manager for the Central Sales District handling Nopco industrial chemicals, Mr. Rankin has been with the company since 1936. A graduate of Lewis Institute in Chicago with a B.S. in chemistry, he began work for Nopco as a chemist. A year later he became Nopco's Industrial Sales Representative in the Southwest territory. In his new assignment, he will make his headquarters at the Pacific Division's main office in Richmond, Calif.

Taking Mr. Rankin's place as Central District Sales Manager will be Walter E. Brewer, who will also continue in his present capacity as Manager of Nopco's Eastern Industrial Sales District.

Mr. Brewer joined Nopco in 1936, also as a chemist. Two years later he became a member of Nopco's sales force, and in 1948 he was appointed Manager of the Eastern Industrial Sales District. Mr. Brewer will continue to make his headquarters at Nopco's main office in Harrison, N. J., but his new duties will make it necessary for him to spend much of his time in the field.

Frank Speight Joins ASTM in Philadelphia

Frank Y. Speight has joined the Staff of the American Society for Testing Materials as Assistant Technical Secretary. He will be located at ASTM Headquarters in Philadelphia. For the past eight years, he has been on the staff of the National Academy of Sciences, National Research Council, Advisory Board on Quartermaster Research and Development as Assistant to the Executive Director. Previously he was engaged in plastics development with the American Cyanamid Co.

His duties with the ASTM will be technical and editorial in nature. Among his early assignments are the Staff contacts with Committees D-9 on Electrical Insulating Materials and D-20 on Plastics.

A native of Georgia, Mr. Speight attended Georgia Institute of Technology but received his degree of B. S. in Chemical Engineering from Alabama Polytechnic Institute in 1938.

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At left above is Leslie D. Carver who has been appointed Export Technical Sales Manager for Witco Chemical Co., and Continental Carbon Co. At right is Carl J. Minnig, who retired in October from Witco and is being retained as a consultant. Mr. Minnig, who has been with Witco-Continental since 1937 is located at Akron, Ohio.

New Financial Appointments Announced by Shell

Allen Howard, formerly auditing department manager for Shell Oil Company, has been appointed assistant controller, it was announced recently. David I. Meriney, formerly assistant auditing department manager, was named to succeed Mr. Howard. Mr. Meriney has been succeeded by James E. Peck, formerly treasury manager for the firm's Midland, Texas, production area office.

Mr. Howard, who succeeds A. A. Buzzi, recently named controller, is a graduate of Pace Institute and a native of New York City. He joined Shell in New York 17 years ago as auditor for the division office. Serving subsequently as auditor in Boston and Jackson Heights, he rose to assistant auditing department manager in 1946 and became manager in 1948.

Mr. Meriney, born in New Orleans, joined Shell in 1929 as an accounting department clerk at Los Angeles after studying at UCLA. He became assistant treasury manager for Los Angeles in 1944, and in 1949 was transferred to the head office in New York as assistant manager of the auditing department.

Mr. Peck, a native of Ottumwa, Iowa, is a commerce graduate of the University of Iowa.

Industry NEWS

Are You Ready?

You've got an extra month to file your 1954 personal tax return. But NOT for your business if it's a corporation. And the extra month won't help individuals who merely wait that much longer to get started.

There are literally thousands of technical changes in the revised law, and effective dates vary. If you aren't familiar with those that apply to you, both as a business man and as an individual taxpayer, you may be out of pocket, either by overpayment or because you slipped up on some requirement and became liable for assessments, interest and possible penalties.

Here's a little quiz game to help you take note of some of the important changes in the new law. Check each of these 10 short statements TRUE or FALSE. Then turn to p. 34 for the correct answers. Unless you're 100% perfect, you had better call on your tax adviser at once. (Perhaps you had better call on him anyway.) This quiz was prepared by the American Institute of Accountants, the national professional society of certified public accountants.

Answers appear on p. 34.

1. You found a bargain in a used truck. It had been driven only 500 miles, and you expect it to last you some years. Under the new tax law, you can deduct your depreciation much faster than under the old law.

True ☐ *False* ☐

2. You're proud of the fact your 17-year-old son got a summer job and earned $1,000. But you are sorry he can no longer be claimed as a dependent since his earnings total more than $600 for the year.

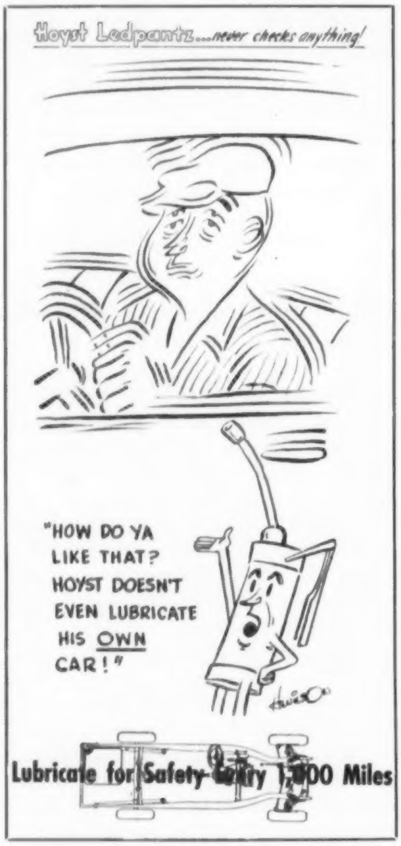
True ☐ *False* ☐

3. You, your two brothers and your uncle have incorporated the family business. All of you would like to modernize your plant, but have hesitated to retain earnings to do so, because of the difficulty of proving the accumulation "reasonable" and because of the penalty tax levied if you did not succeed. Now under the new tax law, it will be easier to prove an accumulation reasonable.

True ☐ *False* ☐

4. You and five other men formed a corporation in the fall of 1954 (after enactment of the new tax law). There were organizational expenses of $5,000 incurred prior to the date of the charter. Since their useful life cannot be precisely determined until such time as the corporation may liquidate, these expenses cannot be amortized for tax purposes by the corporation.

True ☐ *False* ☐



5. You are sole proprietor of your business, married and have one child; this year your business has a profit of $40,000. If you report as an individual, making a joint return and taking three exemptions and the standard deduction, your profit (after tax of $13,036) will be $26,964. After living expenses of $12,220, you will have left $14,744. But now you can report as a corporation and have more money available than if you reported as an individual.

True ☐ *False* ☐

6. Two years ago your business was good, but since that time conditions in your area have deteriorated. This year you will probably sustain some loss. Of course you can carry your loss back a year, but you just broke even last year. You can also carry it forward, spreading the loss over five years. But there is no immediate relief for you.

True ☐ *False* ☐

7. Your firm believes it could increase profits by adding a new line. But several years of research are needed to perfect the product. Your directors feel the business can't afford the cost, since the expenses of research cannot be deducted from income before it is known whether the research is a success or failure.

True ☐ *False* ☐

8. You are a bachelor. Your father died last year leaving your mother to be supported by you. You feel she would be happier staying on in her old home, rather than coming to live with you. But since you are single, you will be denied the tax benefits available to a "head of a household."

True ☐ *False* ☐

9. It has been an expensive year for you. You had some fancy dental work, your wife had an operation, your 17-year old daughter caught an infection, and your grade-school son suffered a complicated fracture of his arm. Altogether you paid medical, dental and hospital bills totaling $10,000, and made an outlay of $500 for drugs and medicines. But fortunately you can deduct $9,700 of these expenses from your adjusted gross income of $20,000.

True ☐ *False* ☐

10. One of your employees dies this year leaving his wife with two small children to support. She has some income of her own and the firm will pay his full salary to her for this year and next. But her income after taxes will be lower for now she will be filing a separate return and not a joint one.

True ☐ *False* ☐

★

Last year about 22 per cent of all chemicals produced were derived from petroleum and natural gas.

API 35th Annual Meeting to Be In San Francisco

Hotel reservation plans for the 35th annual meeting of the American Petroleum Institute, which will be held in San Francisco next November, were announced recently.

Because the size of the meeting will tax San Francisco's hotel facilities, a special API housing committee has been set up on the West Coast to handle hotel assignments.

The Institute announced that all reservation requests must be sent to this special committee, at this address:

API Housing Bureau,
61 Grove Street (Room 300),
San Francisco 2, Calif.

If requests for accommodations are sent to the 61 hotels participating in the meeting plan, they will be referred automatically to the Housing Bureau.

The San Francisco meeting will bring about a number of changes in the Institute's normal operating plans. Instead of one hotel serving as API Headquarters, as is the general practice in Chicago, the assignment will be split among four hotels—the St. Francis, Fairmount, Palace and Mark Hopkins.

General sessions, which usually draw large audiences, will be held in the Curran theater, on Geary Street.

This is what the hotel picture will look like:

Fairmount Hotel—Transportation Division headquarters; all transportation group sessions and committee meetings; public relations group sessions; Board of Councillors meeting:

St. Francis Hotel—Refining and Marketing Divisions headquarters; all refining group sessions and committee meetings; all marketing meetings, with the exception of the marketing group sessions, which will be held in the Mark Hopkins Hotel; all group sessions of the Lubrication, Statistics and American Petroleum Industries Committes.

PAI Press Headquarters will be in the St. Francis.

Palace Hotel—Production Division headquarters; all production group and committee meetings; Financial and Accounting sessions and meet-

ings; Safety and Fire Protection committee meetings.

Mark Hopkins—API Board of Directors and Executive Committee meetings; Fundamental Research group sessions and committee meetings.

Answers to Tax Quiz

Questions appear on p. 32.

NOTE: *The new tax provisions are explained here as they apply to taxpayers reporting for the calendar year on a cash basis. Those using a different fiscal year, or reporting on the accrual basic, should check the official instructions to see how they are affected.*

In all these answers it is assumed that transactions are made in good faith and no special circumstances exist which would alter the effect.

1. *False.* The revised faster rates for depreciation apply only to *new*, not used, equipment.

2. *False.* A child under 19, may be claimed as a dependent, regardless of his earnings, if you furnish more than half of his support. Your son too must file a return and may claim $600 exemption when he does so.

3. *True.* The new law allows a corporation to accumulate up to $60,000 of earnings (total for all years) without being exposed to the penalty. Then, if there is an unreasonable accumulation, the penalty will apply only to that part which is excessive. Furthermore, it is up to the Internal Revenue Service to prove that the amount is excessive.

4. *False.* The new tax law now allows such organizational expenses to be amortized over a period of not less than 60 months, beginning with the month in which the corporation is first active in business.

5. *True.* If you reported as a corporation, as is now permitted, and drew a salary of $15,000 for which you filed a joint return with three exemptions and the standard deduction, your individual tax would be $2,780, leaving you the same amount for living expenses, i.e., $12,220. Your profit of $40,000 less your salary of $15,000 leaves $25,000 on which the corporation tax would be only 30%, or $7,500. Thus, by reporting as a corporation, you would have $17,500, or $3,000 more than if you reported as an individual. But if you elect to report as a corporation you must do so every year from now on unless there is a 20% change in ownership of the business. Note also that earnings kept in the business may later be subject to income tax as dividends or capital gains. And remember, corporations must file by *March* 15.

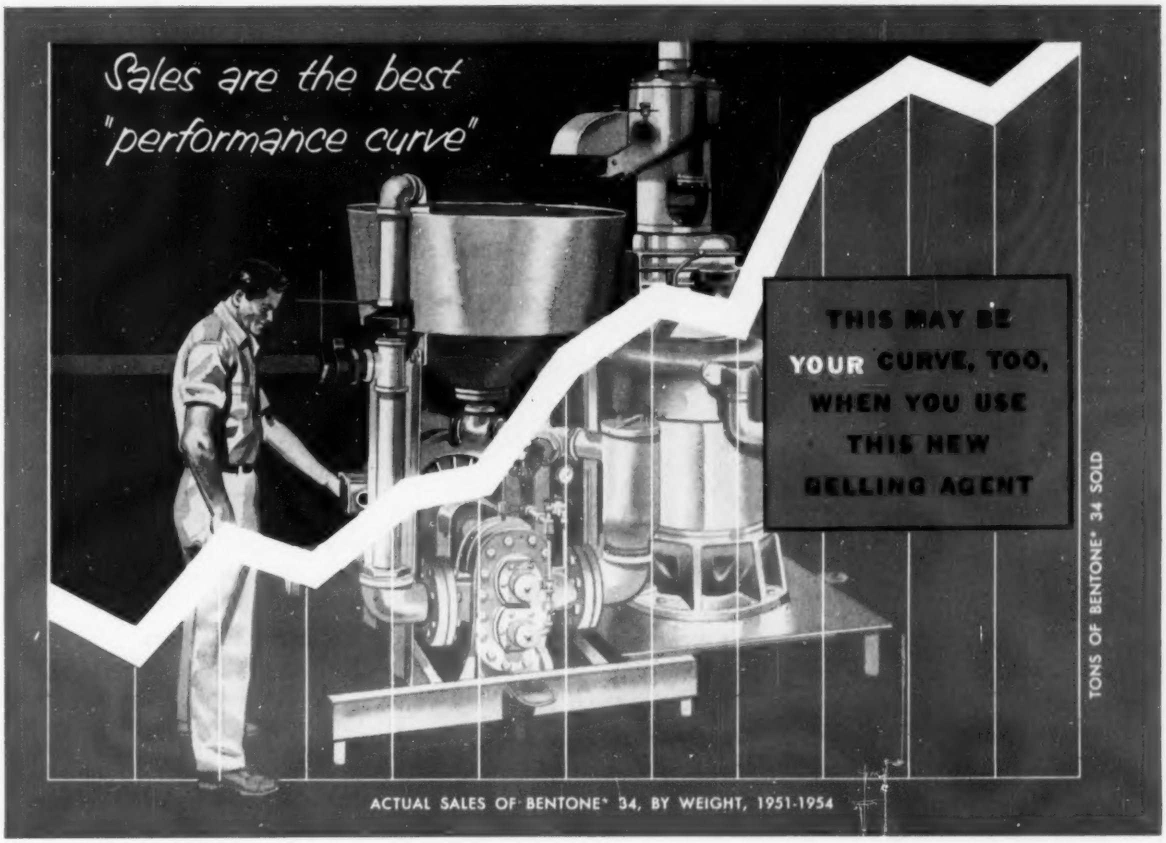
6. *False.* The revised law allows you to carry your loss back two years instead of one, and you can claim a cash refund of taxes you paid two years ago.

7. *False.* The new law permits the immediate write-off of research costs whether or not a patent is secured.

8. *False.* The law has been liberalized and as long as you provide more than half your mother's support and more than half the cost of maintaining her household, you can claim status as head of household even though she does not live under your roof.

9. *True.* The maximum medical and dental deduction has been raised to $2,500 per exemption, up to a total of $10,000 for a head of household or on a joint return. But you can include your outlay for drugs and medicines only to the extent that it exceeds 1% of your adjusted gross income, and you must subtract 3% (formerly 5%) of your adjusted gross income from your dental, medical and hospital expenses, plus the includible drugs and medicines. So $300 of your bill for drugs and medicines can be counted, making $10,300 of medical expenses, of which $600 (3% of $20,000) is not deductible and $9,700 is deductible.

10. *False.* A taxpayer left with a dependent child after death of husband or wife is considered married for the entire year of the death and may file a joint return for the year of the death. Furthermore, the survivor, if she remains unmarried and supports her children in her home, may continue the privilege of income splitting for two years after the year of the death. This means she will be taxed at the rate which applies to half the sum of her total income, the same as on a joint return for husband and wife. Moreover, $5,000 of her deceased husband's salary is classed as a death benefit and is tax-free.



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Socony-Vacuum To Fuel Turbojets

Socony-Vacuum Oil Company, Inc., will fuel the first turboprop airliners to be placed in commercial service in the United States.

Contract for the supply of jet fuel known as JP-4 has been awarded by Trans-Canada Air Lines which will put the first of 22 turboprop Viscounts into service between New York's Idlewild International Airport and Montreal in February.

The contract calls for delivery of more than 2,500,000 gallons of fuel in 1955 and more than 3,000,000 gallons a year in 1956 and 1957, according to Wilbur S. Mount, manager of Socony-Vacuum's Aviation Department. The principal fueling operation will be at Idlewild, but arrangements have been made for alternate fueling at Buffalo, N. Y.

Acheson Colloids Announces New Bulletin

How colloidal dispersions have been used successfully for dry-film lubrication is described in a new, illustrated bulletin, No. 438, just published by Acheson Colloids Company, Port Huron, Michigan.

Technical advances of recent years have demanded the improved lubricating properties provided by such solids as electric-furnace graphite, molybdenum disulfide, zinc oxide, and mica. When these lubricating solids are processed to colloidal size and dispersed in synthetic oils, glycols, mineral spirits, lactol spirits, synthetic resins and other liquid carriers, they produce desirable dry-film lubricating films which are extremely effective over a wide range of operating conditions. The dry film consists of a micro-thin layer of graphite particles left on the surface to be lubricated after the volatile carrier has evaporated. Various combinations of lubricating solids and carriers and their specific application in machine lubrication, metal working, and foundry operations, and other manufacturing processes are presented in the bulletin.

Copies of Bulletin No. 438, "'dag' Colloidal Dispersions for Dry-Film Lubrication," are available free of charge by writing Acheson Colloids Company, Division of Acheson Industries, Port Huron, Michigan.

Lubricate for Safety

FUTURE MEETINGS of the Industry

FEBRUARY, 1955

13-18 ASTM Committee D-2 on Petroleum Products and Lubricants, Rice Hotel, Houston, Texas.

15-17 Texas Oil Jobbers Assn. (management institute), Driskill Hotel, Austin, Texas

16-17 American Petroleum Institute (Division of Marketing, Lubricating Committee) Sheraton-Cadillac Hotel, Detroit, Mich.

MARCH, 1955

15-17 Ohio Petroleum Marketers Association (spring convention and trade exposition), Deshler-Hilton Hotel, Columbus, Ohio.

17-19 Texas Oil Jobbers Assn. (annual convention and trade exposition), Gunter Hotel, San Antonio, Texas

24 National Industrial Conference Board, Shamrock Hotel, Houston, Texas

APRIL, 1955

11-15 Greater New York Safety Council (annual convention and exposition), Statler Hotel, New York, N.Y.

13-15 American Society of Lubrication Engineers (tenth annual meeting and lubrication exhibit), Hotel Sherman, Chicago, Illinois.

MAY, 1955

9-12 American Petroleum Institute (Division of Refining, midyear meeting), Jefferson Hotel, St. Louis, Mo.

16-18 American Petroleum Institute (Division of Marketing, Lubrication Committee), The Greenbrier, White Sulphur Springs, W. Va.

16-18 American Petroleum Institute (Division of Transportation, Products Pipe Line Conference), Edgewater Beach Hotel, Chicago, Ill.

19-20 National Industrial Conference Board, Waldorf-Astoria Hotel, New York, N. Y.

23-25 American Petroleum Institute (Division of Marketing, midyear meeting), Chase and Park Plaza Hotels, St. Louis, Mo.

JUNE, 1955

6-15 Fourth World Petroleum Congress, Rome, Italy.

12-17 SAE Golden Anniversary Summer Meeting, Chalfonte Haddon Hall, Atlantic City, N. J.

26 to July 1 American Society for Testing Materials (annual meeting), Chalfonte-Haddon Hall, Atlantic City, N. J.

OCTOBER, 1955

23-25 National Assn. of Oil Equipment Jobbers (4th annual meeting), Hotel President, Kansas City, Mo.

31 to Nov. 2 NLGI ANNUAL MEETING, EDGEWATER BEACH HOTEL, CHICAGO, ILL.

NOVEMBER, 1955

14-17 American Petroleum Institute (35th annual meeting), San Francisco. Calif.

JUNE, 1956

17-22 American Society for Testing Materials (annual meeting), Chalfonte-Haddon Hall, Atlantic City, N. J.

★

Sign of the times: increased use of diesel oil as railroad power. The Missouri Pacific soon will be completely dieselized, with 873 diesel locomotives instead of the 104 with which they began their diesel program in 1947.


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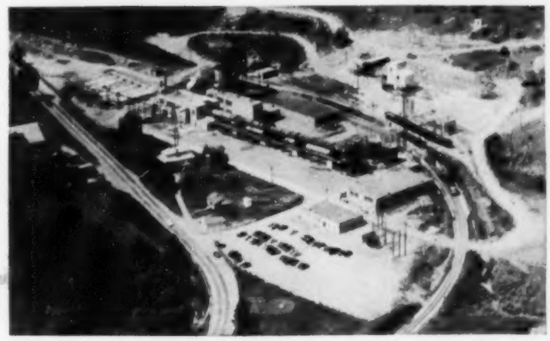

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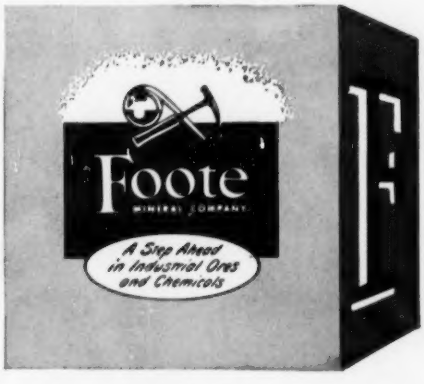

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